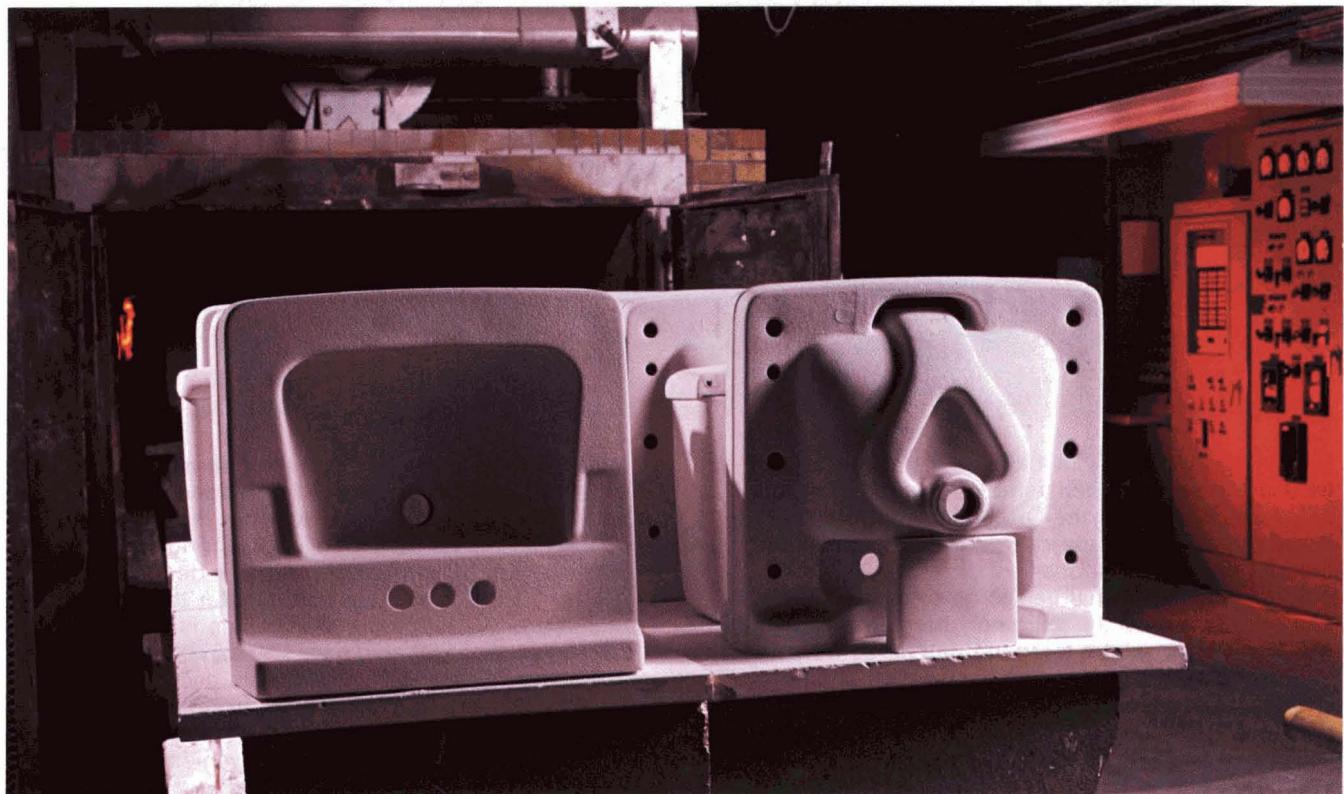


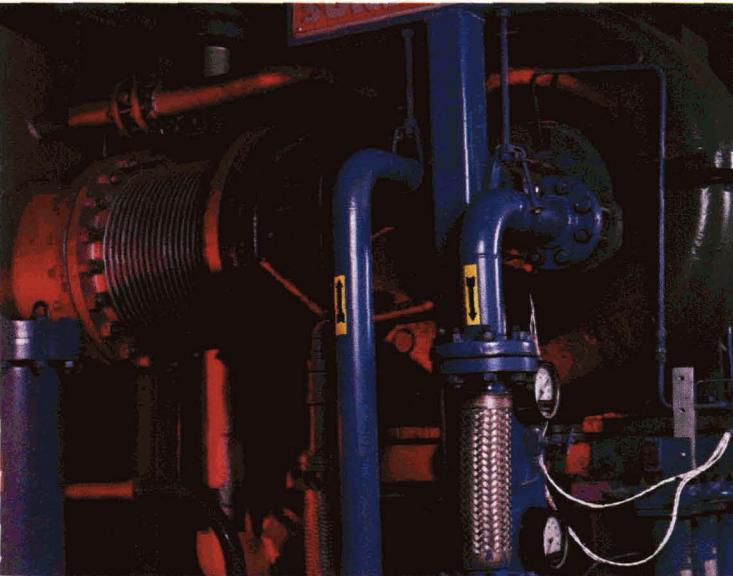
## ENERGY RECOVERY SYSTEM

A "cogeneration" system is one in which the energy ordinarily wasted in an industrial process is recovered and reused to create a second form of energy. The idea has been around for more than 30 years and it saw some industrial application in the 1950s, but usage dwindled thereafter. Today there is a revival of interest due to still-increasing power costs and a number of advanced technology cogeneration systems are being employed in industrial operations. An example is the energy recovery system at Crane Company's plant in Ferguson, Kentucky, which manufactures ceramic bathroom fixtures such as the sinks being conveyed to a kiln (below). Crane's system captures hot stack gases from the company's four ceramic kilns and uses them to produce electrical power for plant operations.

Built by Sundstrand Energy Systems, Rockford, Illinois, the Crane Company installation is the first industrial application in a pilot program jointly sponsored by Sundstrand and the Department of Energy. Key to the system's flexibility, which permits energy recovery from a wide variety of waste heat sources, is an Organic Rankine Cycle (ORC) engine originally developed by Sundstrand for spacecraft electrical power.

In the Crane installation, an exhaust manifold (right) collects waste heat from one or more of the ceramic kilns and directs it to a central vaporizer. There the heat





is used to vaporize a working fluid—toluene in this case. The vaporized toluene drives a turbine (above) connected to the 750 kilowatt ORC generator, which produces electricity and feeds it into a plant distribution system, thus reducing the kilowatt demand on the local utility. The toluene vapor, meanwhile, is recondensed to liquid form, cooled and used again. The whole operation is monitored by a control unit (right), which also synchronizes power from the ORC generator with power supplied by the local utility.

In an initial seven-month test, the Crane system produced 20 percent of the plant's total power requirement while operating at only 75 percent capacity. Crane Company expects to produce 30–40 percent of its own electricity and estimates that reduced power cost will pay back the investment in the cogeneration system within three years.

The NASA/University of Kentucky Technology Applications Program (NASA/UK TAP) played a supporting role in the Crane Company installation, in response to the company's request for assistance in developing improved energy conservation and utilization practices. The idea of using an ORC engine as an industrial cogeneration system emerged from NASA/company cooperation. NASA/UK TAP conducted a search of NASA's computerized data bank for relevant information and was able to provide Crane Company with important information used by the firm to evaluate each of the components of the ORC system prior to commitment. NASA/UK TAP's information also contributed to problem solving during the installation and initial operation. NASA/UK TAP is one of 10 NASA-sponsored dissemination centers that provide informational services and technical help to industrial and government clients.

